

IN THE CLAIMS:

Please cancel claims 23, 27, 32 and 33. Please also amend claims 21, 22, 28, 30 and 31, as shown in the complete list of claims that is presented below.

Claims 1-20 (cancelled).

Claim 21 (currently amended): A method for manufacturing a semiconductor device, in which a first semiconductor chip or substrate and a second semiconductor chip are joined to each other face-to-face via first bumps provided on electrode terminals or wiring of said first semiconductor chip or substrate and second bumps provided on said second semiconductor chip, comprising the steps of:

providing at least one of said first or second bumps with a ~~low melting point metal tin~~ layer having a ~~lower melting point than that of each of said bumps~~ thickness of about 0.1 to about 4 μm , said at least one of said first or second bumps being made of gold;

superposing said first semiconductor chip or substrate and said second semiconductor chip without perfect alignment, such that one is on the other, and said first bumps face corresponding second bumps;

heating up said first semiconductor chip or substrate and said second semiconductor chip to a temperature at which said low-melting point metal layer melts, to thereby self-align said first semiconductor chip or substrate and said second chip and join them to each other; and

filling an insulating resin into a gap between said first semiconductor chip or substrate and said second semiconductor chip after they are joined, said insulating resin having a thermal shrinkage factor of 4% or less;

wherein one of said first bumps and corresponding second bumps is smaller in diameter than the other, and said first and corresponding second bumps are joined by heating such that a fillet is formed and covers at least part of a side wall of the smaller of said first and corresponding second bumps.

Claim 22 (currently amended): The method according to claim 21, wherein said heating up step comprises:

liquefying said ~~low melting point metal tin~~ layer to thereby diffuse metals gold of said first and corresponding second bumps into the liquefied ~~low melting point metal tin~~, by the liquid-phase diffusion method, thus joining said first semiconductor chip or substrate and said second semiconductor chip to each other.

Claims 23-27 (cancelled).

Claim 28 (currently amended): The method according to claim [[24]] 21, wherein said insulating resin and said first and second bumps have approximately the same elastic modulus.

Claim 29 (previously presented): The method according to claim 21, wherein said first and corresponding second bumps have ends that are substantially flat and that are oriented toward one another in said superposing step, the end of the smaller of said first and corresponding second bumps being smaller in area than the end of the larger of said first and corresponding second bumps.

Claim 30 (currently amended): A method for manufacturing a semiconductor device, in which a first semiconductor chip or substrate and a second semiconductor chip are joined to each other face-to-face via gold bumps provided on electrode terminals or wiring of the first semiconductor chip or substrate and gold bumps provided on the second semiconductor chip, the bumps provided on electrode terminals or wiring of the first semiconductor chip or substrate including a first bump with a substantially flat end and the bumps provided on the second semiconductor chip including a second bump having a substantially flat end, said method comprising the steps of:

providing at least one of the first and second bumps with a ~~low melting point tin~~ layer made of a metal having a lower melting point than that of either of the first and second bumps thickness of about 0.1 to about 4 μm ;

superposing the first semiconductor chip or substrate and the second semiconductor chip without perfect alignment between the bumps thereof, the end of the first bump facing the end of the second bump;

heating the first semiconductor chip or substrate and the second semiconductor chip to a temperature at which the metal having a lower melting point melts, to thereby self-align the first semiconductor chip or substrate and the second chip and join them to each other, other, other; and

filling an insulating resin into a gap between the first semiconductor chip or substrate and the second semiconductor chip after they are joined, the insulating resin having a thermal shrinkage factor of 4% or less,

wherein the end of one of the first and second bumps has an area smaller than the end of the other of the first and second bumps, and a fillet of the metal having a lower melting point forms during the heating step and covers at least part of a side wall of the first or second bump with the end having the smaller area.

Claim 31 (currently amended): The method according to claim 30, wherein the heating step comprises:

liquefying the ~~metal having a lower melting point~~ tin to thereby diffuse ~~metals~~ gold of the first and second bumps into the ~~metal having a lower melting point~~ tin.

Claims 32-33 (cancelled).

Claim 34 (previously presented): The method according to claim 33, wherein the insulating resin and the first and second bumps have approximately the same elastic modulus.